Remarks/Arguments:

The applicants greatly appreciate the courtesy extended by Examiner Johnson during a telephone discussion with the applicants' representative on September 9, 2003. The applicants are providing this response consistent with that discussion and are hopeful that the pending prior art rejections of record will be withdrawn and this case will be allowed.

Independent claims 1 and 7 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Alcorn (US 4,912,776) in view of Fredricksen et al. (WO 97/43528). As the Examiner may recall, the applicants and the Examiner have reached agreement in their understanding of what Alcorn teaches, namely, a process and apparatus for removing NO_x from gas streams comprising, in order, an oxidation catalyst for converting the NO content to NO_2, a space for introducing ammonia into the gas stream, and a catalyst for reducing the NO_2 to nitrogen. Although Alcorn uses somewhat odd language at some points, it is clear that the order of steps is critical to carrying out Alcorn, in view of the following citations:

> This invention relates to a process for the *sequential* treatment of a fluid stream containing oxides of nitrogen such as NO and N_2O to NO_2, followed by addition of ammonia, and then followed by treatment with a reducing catalyst to convert the NO_2 to nitrogen and water. (emphasis added)
> Col. 1, lines 13-19.

> The present invention is characterized by the *sequential* treatment of a fluid or gas .... (emphasis added)
> Col. 4, lines 4 and 5.

> The order in which the gas contacts these catalysts is *critical* to the present invention. (emphasis added)
> Col. 4, lines 46-48.

Even though Alcorn mentions a first catalyst carrier, it is critical in Alcorn that this first catalyst carrier be used as a support for an oxidation catalyst, such as platinum or palladium or a mixture of these two. See col. 3, lines 13-15, and col. 4, lines 41-43.

The applicants also believe that agreement was reached in that the independent claims of this application clearly specify a particular order, namely: (1) an oxidation catalyst; (2) a particulate trap; (3) an injection means; and (4) an SCR catalyst. In particular, claims 1 and 7 recite: an oxidation catalyst; a particulate trap *downstream* of the oxidation catalyst; an injection means for injecting reductant fluid *downstream* of the particulate trap, and an SCR catalyst *downstream* of the injection means. Because the claims specify that the injection means is located *downstream* of the particulate trap and that the SCR catalyst is located *downstream* of said injection means, then the injection means must be located between the particulate trap and the SCR catalyst.

The applicants' representative and the Examiner also discussed the criticality of this claimed order. See MPEP § 2144.05. As noted previously, on page 2, lines 24-31 of the application, the applicants "have surprisingly found that a 'pre-oxidizing' step, which is not generally considered necessary because of the low content of CO and unburnt fuel in diesel exhausts, is particularly effective in increasing the conversion of NO_x to N_2 by the SCR system." During the recent discussion, the criticality of this preoxidizing step was also noted, with reference to the specification at page 2, line 24 through page 3, line 5. There, the application explains that the desired NO_2/NO ratio may be adjusted according to the present invention to the most beneficial ratio for the particular SCR catalyst. This ratio varies among metal/zeolite SCR catalysts, rare earth-based SCR catalysts, and other transition metal-based catalysts. Moreover, page 4, lines 22-30 emphasize the significance of placing the particulate trap downstream of the oxidation catalyst and, by noting the relative ease of combustion in the presence of NO_2, upstream of the SCR of NO_x. Consequently, the recited order of features is critical to carrying out the purposes of the invention and imparts, along with the other claim features, patentability to the pending claimed invention.

The applicants' representative and the Examiner also discussed Fredricksen '528. As the applicants' representative emphasized, Fredricksen '528 is primarily directed to a *silencer*, and the particular order of acts does not appear too critical in Fredricksen '528. As discussed previously, Fredricksen '528 discloses that its monoliths may consist of up to three types of purification elements, which are:

> placed one after the other, in the general flow direction of the exhaust gas, each monolith performing one of the following purification processes: (A) Selective Catalytic Reduction (SCR) by ammonia of NO_x in the gas, (B) catalytic oxidation of hydrocarbons and CO in the gas, and (C) removal of soot particles in the gas by filtration in the gas through the porous walls of a monolithic block in which every second channel is plugged at the opposite ends of the channels in the block. The order will typically be that process (A) comes first, while (C) may follow (B), or (B) may follow (C).

See specification at page 17, lines 1-13. As such, this portion of Frederiksen '528 discloses that the injection of NH_3 and contact of the gas with an SCR catalyst occurs upstream of the filter and the oxidation catalyst. Thus, this particular embodiment of the invention of Frederiksen '528 is in direct opposition to the-system as disclosed in Alcorn '776. As such, the proposal for modifying the prior art in an effort to obtain the present invention destroys the intended function of the prior art.

For completeness, the applicants note that Frederiksen '528 also discloses that process (A) could follow (B) or (C). See Frederiksen at page 19, lines 7-14. Consequently, Frederiksen '528 discloses that the SCR catalyst may be downstream of either the oxidation catalyst or the wall-flow filter (depending upon the embodiment). Figures 8, 9, and 10 of Frederiksen '528 show such embodiments of the invention wherein process step (A) "could be performed in the second of the two separate catalyst steps" and where nozzles 38 are placed close to the outlet of the preceding catalyst in order to inject the reducing agent (NH_3). Figures 8, 9, and 10 each disclose monoliths 5i and 5ii, with monolith 5ii being an SCR catalyst. Accordingly, monolith 5i would be *either* an oxidation catalyst *or* a wall-flow filter—but not both. See page 17, lines 1-12 (specifying "each monolith performing one of the following purification processes").

In any of the embodiments described in Fredricksen '528, even after the combination of references, the claimed invention is not satisfied, as the combined references do not result in the particulate trap being "located downstream of said oxidation catalyst" and the injection means being "located downstream of said particulate trap" as called for by the claims. Specifically, if one were to specify that monolith 5i is the trap, then the trap is not downstream

of the oxidation catalyst and if one were to specify that monolith 5i is the oxidation catalyst, then the injection means is not located downstream of the trap.

Also discussed was the rejection of claims 1-4 under Section 103(a) as unpatentable over Alcorn '776 in view of Yavuz '107. As set forth previously, Yavuz '107 discloses an oxidation catalyst for the treatment of diesel engine exhaust wherein the primary purpose of the invention is to reduce the total particulates and HC and CO content of the exhaust. The catalyst disclosed in Yavuz '107 may, in fact, function in a *non-selective, passive* manner to reduce NO_x by employing hydrocarbons as a reductant. However, Yavuz '107 does not disclose the *selective* catalytic reduction (SCR) of NO_x using NH_3 or urea as a reductant. In fact, Yavuz '107 is completely silent with respect to the use of SCR exhaust gas treatment systems utilizing NH_3 or urea. The primary purpose of the catalyst, as disclosed by Yavuz '107, is the oxidation of total particulates and HC and CO. See specification, column 4, lines 57-60. Therefore, the applicants respectfully submit that no motivation exists to combine the Alcorn '776, directed to SCR, and Yavuz '107.

Moreover, the manner in which Yavuz '107 discloses the use of a filter shows that the claimed invention is not obvious. Only at column 7, lines 5-15 does Yavuz contemplate the use of a filter, but merely in passing, by mentioning that "wall-flow carriers (filters)" may be used. See column 7, lines 5-7. This portion of Yavuz '107 is the discussion of the carrier on which the catalytic material is dispersed. The primary focus of this portion is that the carrier may be a flow-through type of carrier. As an alternative embodiment, Yavuz mentions that a wall-flow carrier (i.e., a filter) may be used to support the catalytic material. When put into this context, it is clear that there is no contemplation in Yavuz '107 to use a filter "downstream of the oxidation catalyst." The "filter" function performed by the wall-flow carrier of Yavuz '107 is integral to, not downstream of, the catalytic function. Accordingly, even if one skilled in the art would have been motivated to make the proposed combination, further modification of the combination would be required to satisfy the order of the components of the SCR system, as claimed. Accordingly, the applicants respectfully request withdrawal of the rejection.

The applicants note with appreciation Examiner Johnson's indication in Paper No. 13, page 8, that claims 1 and 7 would be allowable if including an additional limitation. The applicants have added claims 14 and 15 accordingly.

In view of the foregoing amendments and in view of the discussion of September 9, 2003, the applicants respectfully request reconsideration and allowance of the pending claims of this application.

Respectfully submitted,

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Christopher R. Lewis

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